Appendix A-5
Industry/University/Association

IND-1	TPMS	Turbulence Plot Message System
IND-2	ADWA	Automated Delivery of Wind Shear Alerts
IND-3	FDI	Forecasting for De-Icing
IND-4	ATLAS	Aircraft Total Lightning Advisory System
IND-5	WINN	Weather Information Network
IND-6	WHI-DL	Radio-On-A-Chip
IND-7	WHI-VHF	Weather Hazard Information for General Aviation (2-way VHF)
IND-8	RO	Route Optimization
IND-9	S-DARS	Satellite Digital Audio Radio System
IND-10	AWARE	Advanced Weather Awareness and Reporting Enhancements
IND-11	EWxR	Enhanced Weather Radar
IND-12	LIDAR	Light Detection and Ranging
IND-13	SWIS	Satellite Weather Information System
IND-14	WITC	Weather-In-The Cockpit
IND-15	DA	Divert Alerts
IND-16	GLDI	Global Lightning Data Integration
IND-17	APWE	Aviation Pilot Weather Education
UNIV-1	AWHCS	Aviation Weather Hazard Characterization System
UNIV-2	ASC	Aerospace Short Courses
UNIV-3	COMET	Cooperative Program for Operational Meteorology, Education and Training
ASSOC-1	NWA	National Weather Association

Turbulence Plot Message System (TPMS)

PROGRAM/PROJECT:
LEAD AGENCY/COLLABORATING AGENCIES: Northwest Airlines (NWA) and ARINC
LEAD AGENCY POINT OF CONTACT: Tom Fahey, Manager Meteorology, Northwest Airlines, 612-726-3256, tom.fahey@nwa.com
PROGRAM POINT OF CONTACT: Teresa Anderson, Sr. Program Manager, ARINC, 410-266-4202, TAA@arinc.com

SERVICE AREA(S)/INITIATIVE(S)

- ***National Aviation Weather Initiatives:***

  2: 2 **3:** 3 **5:** 2 **6:** 2 **7:** 3 **8:** 2

FUNDING

- ***Programmed/Planned ($'s/FY):*** /FY03 /FY04

TYPE OF PROGRAM/APPLICATION

Product Development

SCOPE OF PROGRAM/PROJECT

- ***What's being developed, procured, etc.:*** *automatic, en-route, text-formatted messages containing aviation weather hazard forecasts, reports, and avoidance procedures.* Eight hazards are included in the system: *Clear Air Turbulence, Mountain Wave induced Turbulence, Thunderstorm Activity, Low Altitude Frontal Wind Shear, Low Altitude Convective Wind Shear, Volcanic Ash, Icing and Ozone.* NWA pilots receive the information in text format via ARINC's Aircraft Communications, Addressing and Reporting System (ACARS). ARINC has developed a system to display the Text Plotted Messages (TPM) graphically and is making it available to airlines via a redistribution agreement with NWA.
- ***How operations will be changed/improved:*** *provides automatic information of en route turbulence and other atmospheric weather hazards to pilots en route, and other end users, to aid in safe and efficient routing.*

PROGRAM/PROJECT MANAGEMENT

- ***Basic guidance document for this program:*** The "Turbulence Plot Handbook".
- ***Program/Project verification process:*** N/A
- ***Method used for end product validation:*** N/A
- ***Operational training for the user:*** eight class hours for new hire pilots; forty hour class for upgrading dispatchers; and Enhanced Weather Information System (EWINS) approved training for all NWA meteorologists as documented in EWINS Training Manual.
-

SCHEDULE/IMPLEMENTATION

- ***Next major program milestone:*** Integration of TPM and Weather Depiction Charts (Upper Air and Surface) into one package available for distribution.
- ***Program becomes operational:*** TPMS is currently operational.
- ***Plans for further improvements:*** Increased use of web based technology for distribution of graphical products.

Automated Delivery of Wind Shear Alerts (ADWA)

PROGRAM/PROJECT:
LEAD AGENCY/COLLABORATING AGENCIES: Northwest Airlines (NWA), Federal Aviation Administration (FAA)
LEAD AGENCY POINT OF CONTACT: Tom Fahey, Manager Meteorology, Northwest Airlines, 612-726-3256, tom.fahey@nwa.com
PROGRAM POINT OF CONTACT:

SERVICE AREA(S)/INITIATIVE(S)

- ***National Aviation Weather Initiatives:***
  6: 2

FUNDING

- ***Programmed/Planned ($'s/FY):*** /FY03 /FY04

TYPE OF PROGRAM/APPLICATION

Product Development

SCOPE OF PROGRAM/PROJECT

- ***What's being developed, procured, etc.:*** *automated delivery of wind shear hazard information to the flight deck.* Northwest Airlines uses the in house Turbulence Plot System (TPS) and the FAA's Terminal Weather Information for Pilots (TWIP) system to deliver alerts of low altitude wind shear hazards to the flight decks of NWA aircraft. Alerts for shears are produced using the Low Level Wind Shear Advisory System (LLWAS), the Terminal Doppler Weather Radar (TDWR), and manually by NWA meteorologists.
- ***How operations will be changed/improved:*** *minimizes the effects of hazardous weather to aircraft on arrival and departure.*

PROGRAM/PROJECT MANAGEMENT

- ***Basic guidance document for this program:*** Part of the "Turbulence Plot Handbook".
- ***Program/Project verification process:*** N/A
- ***Method used for end product validation:*** N/A
- ***Operational training for the user:*** Part of an 8 hour class for new hire pilots; part of a 40 hour class for upgrading dispatchers; and part of the Enhanced Weather Information System (EWINS) approved training for all NWA meteorologists as documented in EWINS Training Manual.

SCHEDULE/IMPLEMENTATION

- ***Next major program milestone:*** N/A
- ***Program becomes operational:*** Has been operational since 1995.
- ***Plans for further improvements:*** Improved accuracy of the automated wind shear alerts.

Forecasting for De-icing

PROGRAM/PROJECT:
LEAD AGENCY: Northwest Airlines (NWA)
LEAD AGENCY POINT OF CONTACT: Tom Fahey, Manager Meteorology, Northwest Airlines, 612-726-3256, tom.fahey@nwa.com
PROGRAM POINT OF CONTACT: Tom Fahey, Manager Meteorology, Northwest Airlines, 612-726-3256, tom.fahey@nwa.com

SERVICE AREA(S)/INITIATIVE(S)

- ***National Aviation Weather Initiatives:***
  4: 1,4,5,6

FUNDING

- ***Programmed/Planned ($'s/FY):*** /FY03 /FY04

TYPE OF PROGRAM/APPLICATION

Product Development

SCOPE OF PROGRAM/PROJECT

- ***What's being developed, procured, etc.:*** *forecasts in 1 hour increments out to 16 hours for percent probability of rime on descent, snowfall, rates of accumulation, freezing precipitation, total accumulations out to 24 hours, existence of frost, wind direction and gusts over 16kts.* Northwest Airlines, EWINS (Enhanced Weather Information System) Certified Aviation Meteorologists produce very detailed forecasts to support ground operations and operations control decision making. These forecasts are made 3 times a day for NWA's three main hub airports. During major winter storms, forecasts are made for 4 to 10 additional airports surrounding the major hubs and include most of the variables listed above as well as a graphical product depicting locations of light, moderate and heavy snowfall rates as well as freezing precipitation.
- ***How operations will be changed/improved:*** *very detailed forecasts to support ground operations and operations control decision making.* Reduces the impact of winter storms on airline operations.

PROGRAM/PROJECT MANAGEMENT

- ***Basic guidance document for this program:*** NWA Meteorology Procedures Manual.
- ***Program/Project verification process:*** N/A
- ***Method used for end product validation:*** N/A
- ***Operational training for the user:*** NWA Meteorology Procedures Manual and semi annual General Refresher classes.

SCHEDULE/IMPLEMENTATION

- ***Next major program milestone:*** N/A
- ***Program becomes operational:*** Operational since 1993.
- ***Plans for further improvements:*** Increased use of web based technology for display and distribution of the products.

Aircraft Total Lightning Advisory System (ATLAS)

PROGRAM/PROJECT: Aircraft Total Lightning Advisory System
LEAD AGENCY/COLLABORATING AGENCIES: Airborne Research Associates
LEAD AGENCY POINT OF CONTACT:
PROGRAM POINT OF CONTACT: Ralph Markson, 781-899-1834, rmarkson@comcast.net

SERVICE AREA/INITIATIVE

- ***National Aviation Weather Initiatives:***
  2: 5, 9

FUNDING

- ***Programmed/Planned ($'s/FY):*** 400K/FY05 400K/FY06 /FY07

TYPE OF PROGRAM/APPLICATION

R&D

SCOPE OF PROGRAM/PROJECT

- ***What's being developed, procured, etc:*** *a single sensor total lightning [cloud-to-ground (CG) and intracloud (IC)] mapping system for use on aircraft and/or on the ground. In addition a system is being developed using an array of separated ground based sensors that will provide this information regionally and nationally.*
- ***How operations will be changed/improved:*** *detection of IC lightning typically provides 5 to 30 minutes advanced warning of air-mass thunderstorm development and associated convective hazards. The rate of IC flashes also provides a measure of convective intensity which is not available from less frequent CG flash data.* Advanced warning of convective hazards associated with thunderstorms can potentially reduce accidents and increase efficiency of operations within the National Airspace System.

PROGRAM/PROJECT MANAGEMENT

- ***Basic guidance document for this program:*** *(1)* Final Report NASA/STTR Contract NAS1-20513, ATLAS: Aircraft Total Lightning Advisory System, August 1996; (2) Final Report NASA/STTR Contract NAS1-20594; LASI: Lightning and Storm Intensity Weather Warning System, April 1998; (3) Final Report, Atlas Validation Project, submitted to NASA/Langley Research Center, AWIN Program, December 1999; (4) US Patent No. 4,996,473 "Microburst/Windshear Warning System", 1991, (covers microburst prediction and quantification of storm intensity using lightning data acquired with any lightning mapping system).
- ***Program/Project verification process:*** A multi-station total lightning network will verify the single sensor.
- ***Method used for end product validation:*** Product validation for the current development of an aircraft system can be through comparison with data from the Kennedy Space Center's Lightning Detection and Ranging System (LDAR), the National Lightning Detection Network (NLDN), ARA's multi-sensor ground based array and NexRad maps.
- ***Operational training for the user:*** Training will be provided by Airborne Research Associates.

SCHEDULE/IMPLEMENTATION

- ***Next major program milestone:*** First demonstration planned for 2005.
- ***Program becomes operational:*** Dependent on other companies for marketing and production.
- ***Plans for further improvements:*** Complete a new algorithm utilizing spectrographic analysis to better identify first pulses.

Weather Information Network (WINN)

PROGRAM/PROJECT:
LEAD AGENCY/COLLABORATING AGENCIES: Honeywell
LEAD AGENCY POINT OF CONTACT: Dan Leger, Weather Services Manger, Honeywell, 602-436-6512, daniel.r.leger@honeywell.com
PROGRAM POINT OF CONTACT: Dan Leger, Weather Services Manger, Honeywell, 602-436-6512, daniel.r.leger@honeywell.com

SERVICE AREA(S)/INITIATIVE(S)

- ***National Aviation Weather Initiatives:***

1: 6 **2:** 3 **3:** 4 **5:** 3 **6:** 3 **7:** 4 **8:** 4

FUNDING

- ***Programmed/Planned ($'s/FY):*** /FY03 /FY04

TYPE OF PROGRAM/APPLICATION

Commercial

SCOPE OF PROGRAM/PROJECT

- ***What's being developed, procured, etc.:*** *a cockpit display and communications capability to deliver near real-time ground-based, graphical weather hazard and beneficial indications to the cockpit and Airline Operation Centers,* anywhere in the world. This system is part of a total aircraft information infrastructure being developed and demonstrated by Honeywell for commercial airline application. WINN focuses on providing updated weather information and graphics to the airborne flight crew.
- ***How operations will be changed/improved:*** *The commercial airline flight crew will have on-demand access to aviation weather information and updates, and automatic access to hazardous weather alerts as they are generated resulting in safer and more efficient operations.*

PROGRAM/PROJECT MANAGEMENT

- ***Basic guidance document for this program:*** N/A
- ***Program/Project verification process:*** N/A
- ***Method used for end product validation:*** N/A
- ***Operational training for the user:*** Class room training.

SCHEDULE/IMPLEMENTATION

- ***Next major program milestone:*** N/A
- ***Program becomes operational:*** WINN is being marketed commercially by Honeywell.
- ***Plans for further improvements:*** N/A

Radio-On-A-Chip
Honeywell-NASA Cooperative Research Agreement (CRA)

PROGRAM/PROJECT: Weather Accident Prevention Project/Weather Information Communications
LEAD AGENCY/COLLABORATING AGENCIES: National Aeronautics and Space Administration (NASA)
LEAD AGENCY POINT OF CONTACT: Gus Martzaklis, GRC, 216-433-8966, Konstantinos.S.Martzaklis@nasa.gov
PROGRAM POINT OF CONTACT: Michael Jarrell, GRC, 216-433-8102, michael.a.jarrell@nasa.gov

SERVICE AREA (S)/INITIATIVE (S)

- ***National Aviation Weather Initiatives:***
  1: 6 **2:** 3 **3:** 4 **5:** 3 **6:** 3 **7:** 4 **8:** 4

FUNDING

- ***Programmed/Planned ($'s/FY):*** /FY03 /FY04

TYPE OF PROGRAM/APPLICATION

R&D

SCOPE OF PROGRAM/PROJECT

- ***What's being developed, procured, etc.:*** *technologies and prototype to enable display of graphical weather information in general aviation aircraft via data link using handheld low cost VDL avionics.*
- ***How will operations be changed/improved:*** *new weather information technologies will provide a capability to display graphical, intuitive weather information in general aviation cockpits, leading to improved situational awareness and improved decision making by General Aviation pilots with respect to weather hazards, assisting in the reduction of aircraft accidents attributable to weather.*

PROGRAM/PROJECT MANAGEMENT

- ***Basic guidance document for this program:*** WxAP Project Plan.
- ***Program/Project verification process:*** NASA sponsored annual Weather Accident Prevention reviews, Aviation Safety Program Executive Council reviews, and reviews/audits at the project/element level.
- ***Method used for end product validation:*** Combination of (a) system-level modeling and simulations, (b) laboratory-based experiments and (c) flight experiments via appropriate industry and/or NASA research aircraft. Many of these validation efforts are performed under cost-shared cooperative research agreements with industry partners.
- ***Operational training for the user:*** Training guidance for the use of new graphical weather information technologies will be developed in conjunction with the AvSP System Wide Accident Prevention (SWAP) project.

SCHEDULE/IMPLEMENTATION

- ***Next major program milestone:*** N/A
- ***Program becomes operational:*** CRA will end in Jan'04.
- ***Plans for further improvements:*** N/A

Weather Hazard Information for General Aviation
ARNAV-NASA Cooperative Research Agreement (CRA)

PROGRAM/PROJECT: Weather Accident Prevention Project/Weather Information Communications
LEAD AGENCY/COLLABORATING AGENCIES: National Aeronautics and Space Administration (NASA), Federal Aviation Administration (FAA),
LEAD AGENCY POINT OF CONTACT: Gus Martzaklis, GRC, 216-433-8966, Konstantinos.S.Martzaklis@nasa.gov
PROGRAM POINT OF CONTACT: Michael Jarrell, GRC, 216-433-8102, michael.a.jarrell@nasa.gov

SERVICE AREA (S)/INITIATIVE (S)

- ***National Aviation Weather Initiatives:***
  N/A

FUNDING

- ***Programmed/Planned ($'s/FY):*** /FY03 /FY04

TYPE OF PROGRAM/APPLICATION

R&D

SCOPE OF PROGRAM/PROJECT

- ***What's being developed, procured, etc.:*** *Phase I, which completed in Dec 2000 was to study the need for graphical weather information. Phase II, which completed in Dec 2002, concerned weather product development. .*
- ***How will operations be changed/improved:*** *improved situational awareness and improved decision making by General Aviation pilots with respect to weather hazards, assisting in the reduction of aircraft accidents attributable to weather.*

PROGRAM/PROJECT MANAGEMENT

- ***Basic guidance document for this program:*** WxAP Project Plan.
- ***Program/Project verification process:*** NASA sponsored annual Weather Accident Prevention reviews, Aviation Safety Program Executive Council reviews, and reviews/audits at the project/element level.
- ***Method used for end product validation:*** Combination of (a) system-level modeling and simulations, (b) laboratory-based experiments and (c) flight experiments via appropriate industry and/or NASA research aircraft. Many of these validation efforts are performed under cost-shared cooperative research agreements with industry partners.
- ***Operational training for the user:*** Training guidance for the use of new graphical weather information technologies will be developed in conjunction with the AvSP System Wide Accident Prevention (SWAP) project.

SCHEDULE/IMPLEMENTATION

- ***Next major program milestone:*** N/A
- ***Program becomes operational:*** Complete
- ***Plans for further improvements:*** N/A

Route Optimization
Honeywell-NASA Cooperative Research Agreement (CRA)

PROGRAM/PROJECT: Weather Accident Prevention Project
LEAD AGENCY/COLLABORATING AGENCIES: Honeywell, National Aeronautics and Space Administration (NASA)
LEAD AGENCY POINT OF CONTACT: Gus Martzaklis, GRC, 216-433-8966, Konstantinos.S.Martzaklis@nasa.gov
PROGRAM POINT OF CONTACT: Paul Stough, LaRC, 757-864-3860, h.p.stough@larc.nasa.gov

SERVICE AREA (S)/INITIATIVE (S)

- ***National Aviation Weather Initiatives:***
  None

FUNDING

- ***Programmed/Planned ($'s/FY):*** /FY03 /FY04

TYPE OF PROGRAM/APPLICATION

R&D

SCOPE OF PROGRAM/PROJECT

- ***What's being developed, procured, etc.:*** *a decision support tool using new 3-dimensional algorithm and user-centered interface to enable dispatchers to consider weather information when developing routes.* Honeywell will develop and demonstrate a weather decision support tool for use by dispatchers when developing routes.
- ***How will operations be changed/improved:*** *new decision support tools will provide dispatchers with 3-D graphical weather information, improving the ability to route aircraft around weather hazards and assisting in the reduction of aircraft accidents attributable to weather.*

PROGRAM/PROJECT MANAGEMENT

- ***Basic guidance document for this program:*** WxAP Project Plan.
- ***Program/Project verification process:*** NASA sponsored annual Weather Accident Prevention reviews, Aviation Safety Program Executive Council reviews, and reviews/audits at the project/element level.
- ***Method used for end product validation:*** Combination of (a) system-level modeling and simulations, (b) laboratory-based experiments and (c) flight experiments via appropriate industry and/or NASA research aircraft. Many of these validation efforts are performed under cost-shared cooperative research agreements with industry partners.
- ***Operational training for the user:*** Training guidance for the use of new graphical weather information technologies will be developed in conjunction with the AvSP System Wide Accident Prevention (SWAP) project.

SCHEDULE/IMPLEMENTATION

- ***Next major program milestone:*** N/A
- ***Program becomes operational:*** N/A
- ***Plans for further improvements:*** Addition of terminal area weather to dispatcher decision support tool and improved graphical user interface.

Satellite Digital Audio Radio Service (S-DARS)
Phase I & II Demonstration
Rockwell Collins-NASA Cooperative Research Agreement (CRA)

PROGRAM.PROJECT: Weather Accident Prevention Project/Weather Information Communications
LEAD AGENCY/COLLABORATING AGENCIES: Rockwell Collins, National Aeronautics and Space Administration (NASA)
LEAD AGENCY POINT OF CONTACT: Gus Martzaklis, GRC, 216-433-8966, Konstantinos.S.Martzaklis@nasa.gov
PROGRAM POINT OF CONTACT: Michael Jarrell, GRC, 216-433-8102, michael.a.jarrell@nasa.gov

SERVICE AREA(S)/INITIATIVE(S)

- ***National Aviation Weather Initiatives:***
  1: 2 **2:** 2 **3:** 3 **5:** 2 **6:** 2 **7:** 3 **8:** 2

FUNDING

- ***Programmed/Planned ($'s/FY):*** /FY03 /FY04

TYPE OF PROGRAM/APPLICATION

Proof of Concept.

SCOPE OF PROGRAM/PROJECT

- ***What's being developed, procured, etc.:*** *demonstrate the use of satellite digital audio radio to provide low cost, high bandwidth communications to airborne commercial airliners*. A number of applications are being demonstrated on American Airlines flights over the North Pacific. Delivery of high-resolution weather graphics to the flight deck is one application. NCAR-RAP provides gridded weather hazard data to the S-DARS network (convection, in-flight icing, turbulence; oceanic hazards) via an S-DARS server.
- ***How operations will be changed/improved:*** *Near real-time oceanic weather hazard update capability for the airborne flight crew; on-demand and automatic updates for CONUS weather hazard information and alerts.*

PROGRAM/PROJECT MANAGEMENT

- ***Basic guidance document for this program:*** Rockwell Collins/NASA cooperative agreement; NASA/NCAR cooperative agreement.
- ***Program/Project verification process:*** Program reviews, monthly reporting, phase final reports.
- ***Method used for end product validation:*** In-service evaluations (ISE) on revenue passenger flights.
- ***Operational training for the user:*** Hands-on and textual materials.

SCHEDULE/IMPLEMENTATION

- ***Next major program milestone:*** N/A
- ***When program will become operational:*** N/A- Proof of concept complete.
- ***Plans for further improvements:*** N/A

Advanced Weather Awareness and Reporting Enhancements (AWARE)
Rockwell-NASA Cooperative Research Agreement (CRA)

PROGRAM/PROJECT: Weather Accident Prevention Project
LEAD AGENCY/COLLABORATING AGENCIES: Rockwell, National Aeronautics and Space Administration (NASA)
LEAD AGENCY POINT OF CONTACT: Gus Martzaklis, GRC, 216-433-8966, Konstantinos.S.Martzaklis@nasa.gov
PROGRAM POINT OF CONTACT: Paul Stough, LaRC, 757-864-3860, h.p.stough@larc.nasa.gov

SERVICE AREA (S)/INITIATIVE (S)

- ***National Aviation Weather Initiatives:***
  N/A

FUNDING

- ***Programmed/Planned ($'s/FY):*** /FY03 /FY04

TYPE OF PROGRAM/APPLICATION

R&D/Prototype Demonstration

SCOPE OF PROGRAM/PROJECT

- ***What's being developed, procured, etc.:*** *technologies and prototype to enable display and briefing of flight plan relevant graphical and text-based weather information, and decision support tools to advise pilot of probability of mission success based on pilot preferences, risk tolerance, and aircraft equipage (advisory only).*

- ***How will operations be changed/improved:*** *improvements in pre-flight weather briefings, particularly for General Aviation pilots, consisting of flight plan relevant information and decision support aids, will lead to improved pilot situational awareness. These technologies will assist in the reduction of aircraft accidents attributable to weather.*

PROGRAM/PROJECT MANAGEMENT

- ***Basic guidance document for this program:*** WxAP Project Plan.
- ***Program/Project verification process:*** NASA sponsored annual Weather Accident Prevention reviews, Aviation Safety Program Executive Council reviews, and reviews/audits at the project/element level.
- ***Method used for end product validation:*** Combination of (a) system-level modeling and simulations, (b) laboratory-based experiments and (c) flight experiments via appropriate industry and/or NASA research aircraft. Many of these validation efforts are performed under cost-shared cooperative research agreements with industry.
- ***Operational training for the user:*** Training guidance for the use of new graphical weather pre-flight briefings will be developed in conjunction with the AvSP System Wide Accident Prevention (SWAP) project.

SCHEDULE/IMPLEMENTATION

- ***Next major program milestone:*** N/A
- ***Program becomes operational:*** The AWARE CRA has been completed and the technology is being integrated into NASA's Airborne Hazard Awareness System (AHAS).
- ***Plans for further improvements:*** N/A

Enhanced Weather Radar (EWxR)
Rockwell-NASA Cooperative Research Agreement (CRA)

PROGRAM/PROJECT: Weather Accident Prevention Project
LEAD AGENCY/COLLABORATING AGENCIES: National Aeronautics and Space Administration (NASA)
LEAD AGENCY POINT OF CONTACT: Gus Martzaklis, GRC, 216-433-8966, Konstantinos.S.Martzaklis@nasa.gov
PROGRAM POINT OF CONTACT: Paul Stough, LaRC, 757-864-3860, h.p.stough@larc.nasa.gov

SERVICE AREA (S)/INITIATIVE (S)

- ***National Aviation Weather Initiatives:***
  N/A

FUNDING

- ***Programmed/Planned ($'s/FY):*** /FY03 /FY04

TYPE OF PROGRAM/APPLICATION

R&D/Prototype Demonstration

SCOPE OF PROGRAM/PROJECT

- ***What's being developed, procured, etc.:*** *technologies and prototype to enable display of combined unlinked and on-board sensed graphical weather radar information in transport cockpits.* Rockwell-Collins will develop and demonstrate a system for processing unlinked weather information from ground sources and combining this information with that from on-board weather radar sensors for display on a graphical weather display in the cockpit.
- ***How will operations be changed/improved:*** *combined data from diverse weather sources will provide a complete weather picture including information sensed in the near-vicinity of the aircraft and forecast data, leading to improved pilot situational awareness and allowing collaborative decision making between pilots, ATC, and AOC. These technologies will assist in the reduction of aircraft accidents attributable to weather.*

PROGRAM/PROJECT MANAGEMENT

- ***Basic guidance document for this program:*** WxAP Project Plan.
- ***Program/Project verification process:*** NASA sponsored annual Weather Accident Prevention reviews, Aviation Safety Program Executive Council reviews, and reviews/audits at the project/element level.
- ***Method used for end product validation:*** Combination of (a) system-level modeling and simulations, (b) laboratory-based experiments and (c) flight experiments via appropriate industry and/or NASA research aircraft. Many of these validation efforts are performed under cost-shared cooperative research agreements with industry partners.
- ***Operational training for the user:*** Training guidance for the use of new graphical weather information technologies combining forecast and nowcast or in-situ data will be developed in conjunction with the AvSP System Wide Accident Prevention (SWAP) project.

SCHEDULE/IMPLEMENTATION

- ***Next major program milestone:*** N/A
- ***Program becomes operational:*** The EWxR CRA has been completed and the technology is being integrated into NASA's Airborne Hazard Awareness System (AHAS).
- ***Plans for further improvements:*** N/A

LIDAR Forward-Looking Turbulence Detection System (LIDAR)
Coherent Technologies (CTI)-NASA Cooperative Research Agreement (CRA)

PROGRAM/PROJECT: Weather Accident Prevention Project
LEAD AGENCY/COLLABORATING AGENCIES: Coherent Technologies Inc. (CTI), National Aeronautics and Space Administration (NASA)
LEAD AGENCY POINT OF CONTACT: Gus Martzaklis, GRC, 216-433-8966, Konstantinos.S.Martzaklis@nasa.gov
PROGRAM POINT OF CONTACT: Jim Watson, LaRC, 757-864-6985, James.f.watson@nasa.gov, Rod Bogue, DFRC, 661-276-3193, rod.bogue@nasa.gov

SERVICE AREA (S)/INITIATIVE (S)

- ***National Aviation Weather Initiatives:***
  7: 9

FUNDING

- ***Programmed/Planned ($'s/FY):*** /FY03 /FY04

TYPE OF PROGRAM/APPLICATION

R&D/Prototype Demonstration

SCOPE OF PROGRAM/PROJECT

- ***What's being developed, procured, etc.:*** *LIDAR technologies to enable detection of clear air turbulence with an airborne sensor system.*
- ***How will operations be changed/improved:*** *airborne detection of clear air turbulence will enable mitigation procedures to be performed to reduce the probability of injuries caused by encounter with a turbulence event.*

PROGRAM/PROJECT MANAGEMENT

- ***Basic guidance document for this program:*** WxAP Project Plan.
- ***Program/Project verification process:*** NASA sponsored annual Weather Accident Prevention reviews, Aviation Safety Program Executive Council reviews, and reviews/audits at the project/element level.
- ***Method used for end product validation:*** Combination of (a) system-level modeling and simulations, (b) laboratory-based experiments and (c) flight experiments via appropriate industry and/or NASA research aircraft. Many of these validation efforts are performed under cost-shared cooperative research agreements with industry partners.
- ***Operational training for the user:*** Training guidance for the use of turbulence warning information will be developed in conjunction with the AvSP System Wide Accident Prevention (SWAP) project.

SCHEDULE/IMPLEMENTATION

- ***Next major program milestone:*** N/A
- ***Program becomes operational:*** WxAP develops enabling technologies that need to be implemented by industry or other government agencies. Working cooperatively with industry through CRA's will enable quicker implementation and technology transfer to meet the project safety goal.
- ***Plans for further improvements:*** Forward-looking turbulence detection systems combining both Radar and LIDAR sensing technologies will be developed and demonstrated in a flight environment.

Satellite Weather Information System (SWIS)
Rockwell-NASA Cooperative Research Agreement (CRA)

PROGRAM/PROJECT: Weather Accident Prevention Project/Weather Information Communications
LEAD AGENCY/COLLABORATING AGENCIES: National Aeronautics and Space Administration (NASA)
LEAD AGENCY POINT OF CONTACT: Gus Martzaklis, GRC, 216-433-8966, Konstantinos.S.Martzaklis@nasa.gov
PROGRAM POINT OF CONTACT: Michael Jarrell, GRC, 216-433-8102, michael.a.jarrell@nasa.gov

SERVICE AREA (S)/INITIATIVE (S)

- ***National Aviation Weather Initiatives***:
  N/A- See IND-10

FUNDING

- ***Programmed/Planned ($'s/FY):*** /FY03 /FY04

TYPE OF PROGRAM/APPLICATION

R&D/Prototype Demonstration

SCOPE OF PROGRAM/PROJECT

- ***What's being developed, procured, etc.:*** *technologies to enable dissemination of graphical weather information to the cockpit using satellite communication data link.* Rockwell Collins and other industry partners developed and demonstrated a cockpit weather information system for the display of graphical weather information disseminated via satellite data link technologies.
- ***How will operations be changed/improved:*** *the use of satellite data link for dissemination of graphical weather information will enable the use of advanced cockpit weather information systems any where in the world. These technologies will assist in the reduction of aircraft accidents attributable to weather.*

PROGRAM/PROJECT MANAGEMENT

- ***Basic guidance document for this program:*** WxAP Project Plan.
- ***Program/Project verification process:*** NASA sponsored annual Weather Accident Prevention reviews, Aviation Safety Program Executive Council reviews, and reviews/audits at the project/element level.
- ***Method used for end product validation:*** Combination of (a) system-level modeling and simulations, (b) laboratory-based experiments and (c) flight experiments via appropriate industry and/or NASA research aircraft. Many of these validation efforts are performed under cost-shared cooperative research agreements with industry partners.
- ***Operational training for the user:*** Training guidance for the use of new graphical weather information technologies will be developed in conjunction with the AvSP System Wide Accident Prevention (SWAP) project.

SCHEDULE/IMPLEMENTATION

- ***Next major program milestone:*** N/A
- ***Program becomes operational:*** WxAP develops enabling technologies that need to be implemented by industry or other government agencies. Working cooperatively with industry through CRA's will enable quicker implementation and technology transfer to meet the project safety goal.
- ***Plans for further improvements:*** Aviation weather information technologies using satellite data link technologies will be further developed and demonstrated for General Aviation as well as transport aircraft.

Weather-In-The-Cockpit (WITC)
Sonalysts-NASA Cooperative Research Agreement (CRA)

PROGRAM/PROJECT:
LEAD AGENCY/COLLABORATING AGENCIES: Sonalysts, Inc., National Aeronautics and Space Administration (NASA)
LEAD AGENCY POINT OF CONTACT: Rip Coleman, Vice President, Aviation and Weather Analysis Systems, Sonalysts, Inc., 860-442-4355, coleman@sonalysts.com
PROGRAM POINT OF CONTACT: Same as above.

SERVICE AREA (S)/INITIATIVE (S)

- ***National Aviation Weather Initiatives:***
  None

FUNDING

- ***Programmed/Planned ($'s/FY):*** /FY03 /FY04

TYPE OF PROGRAM/APPLICATION

R&D/ Prototype Demonstration

SCOPE OF PROGRAM/PROJECT

- ***What's being developed, procured, etc:*** *a means of collecting and integrating multi-source, geo-referenced data from around the world and delivering timely decision support assistance directly to the cockpits of international air carriers.*
- ***How operations will be changed/improved:*** *improved weather information in the cockpit will enhance flight operations.*

PROGRAM/PROJECT MANAGEMENT

- ***Basic guidance document for this program:*** N/A
- ***Program/Project verification process:*** Internal, Sonalysts, Inc. Full program/project verification process includes initial requirements and design specification, coding, test case/plan development, integration testing, and user-conducted alpha/beta testing prior to release. For new products there is also provision for conducting numerous case studies to ensure the accuracy of new data as it is integrated with a virtually unlimited set of worldwide, geo-referenced data sources. Every aspect of software development at Sonalysts, Inc. is conducted under strict configuration management and all code is extensively documented.
- ***Method used for end product validation:*** As described above, Sonalysts, Inc. software engineering process includes extensive validation testing before implementation.
- ***Operational training for the user:*** Sonalysts, Inc. provides initial and recurring classroom and hands on training for the wXstation suite of products.

SCHEDULE/IMPLEMENTATION

- ***Next major program milestone:*** N/A
- ***When program will become operational:*** Currently available.
- ***Plans for further improvements:*** N/A

Divert Alerts (DA)

PROGRAM/PROJECT:
LEAD AGENCY/COLLABORATING AGENCIES: Sonalysts, Inc.
LEAD AGENCY POINT OF CONTACT: Rip Coleman, Vice President, Aviation and Weather Analysis Systems, Sonalysts, Inc., 860-442-4355, coleman@sonalysts.com
PROGRAM POINT OF CONTACT: Same as above.

SERVICE AREA (S)/INITIATIVE (S)

- ***National Aviation Weather Initiatives***:
  None

FUNDING

- ***Programmed/Planned ($'s/FY):*** /FY03 /FY04

TYPE OF PROGRAM/APPLICATION

R&D/Prototype Demonstration

SCOPE OF PROGRAM/PROJECT

- ***What's being developed, procured, etc:*** *a means of quickly determining when an aircraft has been diverted and displaying that aircraft in such a way as to increase situational awareness for the flight dispatcher.*
- ***How operations will be changed/improved:*** *diverted aircraft can now be quickly identified and directed to airports with good landing weather which have adequate maintenance facilities and gate space.*

PROGRAM/PROJECT MANAGEMENT

- ***Basic guidance document for this program:*** Jointly developed Sonalysts, Inc. and United Airlines.
- ***Program/Project verification process:*** Internal, Sonalysts, Inc. Full program/project verification process includes initial requirements and design specification, coding, test case/plan development, integration testing, and user-conducted alpha/beta testing prior to release. For new products there is also provision for conducting numerous case studies to ensure the accuracy of new data as it is integrated with a virtually unlimited set of worldwide, geo-referenced data sources. Every aspect of software development at Sonalysts, Inc. is conducted under strict configuration management and all code is extensively documented.
- ***Method used for end product validation:*** As described above, Sonalysts, Inc. software engineering process includes extensive validation testing before implementation.
- ***Operational training for the user:*** Sonalysts, Inc. provides initial and recurring classroom and hands on training for the wXstation suite of products, including FlightTraX™.

SCHEDULE/IMPLEMENTATION

- ***Next major program milestone:*** N/A
- ***When program will become operational:*** Currently available.
- ***Plans for further improvements:*** N/A

Global Lightning Data Integration (GLDI)

PROGRAM/PROJECT:
LEAD AGENCY/COLLABORATING AGENCIES: Sonalysts, Inc.
LEAD AGENCY POINT OF CONTACT: Rip Coleman, Vice President, Aviation and Weather Analysis Systems, Sonalysts, Inc., 860-442-4355, coleman@sonalysts.com
PROGRAM POINT OF CONTACT: Same as above.

SERVICE AREA (S)/INITIATIVE (S)

- ***National Aviation Weather Initiatives:***
  2: 9

FUNDING

- ***Programmed/Planned ($'s/FY):*** /FY03 /FY04

TYPE OF PROGRAM/APPLICATION

R&D/Prototype Demonstration

SCOPE OF PROGRAM/PROJECT

- ***What's being developed, procured, etc:*** *a means of collecting and integrating lightning data from around the world with all other international geo-referenced data sets.*
- ***How operations will be changed/improved:*** *determination of severity of convection over remote areas, e.g. Central Pacific Ocean, will be enhanced by fusing lightning data with existing data like satellite imagery.* This will directly impact the accuracy of convection and turbulence advisories provided to international flight crews.

PROGRAM/PROJECT MANAGEMENT

- ***Basic guidance document for this program:*** N/A
- ***Program/Project verification process:*** Internal, Sonalysts, Inc. Full process includes initial requirements and design specification, coding, test case/plan development, integration testing, and user-conducted alpha/beta testing prior to release. For new products there is also provision for conducting numerous case studies to ensure the accuracy of new data as it is integrated with a virtually unlimited set of worldwide, geo-referenced data sources. Every aspect of software development at Sonalysts, Inc. is conducted under strict configuration management and all code is extensively documented.
- ***Method used for end product validation:*** As described above, Sonalysts, Inc. software engineering process includes extensive validation testing before implementation.
- ***Operational training for the user:*** Provided for all wXstation® products including StormTraX®. Initial and recurring classroom and hands on training.

SCHEDULE/IMPLEMENTATION

- ***Next major program milestone:*** N/A
- ***Program becomes operational:*** N/A
- ***Plans for further improvements:*** N/A

Aviation Pilot Weather Education (APWE)

PROGRAM/PROJECT:
LEAD AGENCY/COLLABORATING AGENCIES: Air Safety Foundation (ASF), Aircraft Owners and Pilots Association (AOPA)
LEAD AGENCY POINT OF CONTACT: Bruce Landsberg, Executive Director, Air Safety Foundation, 301-695-2000, bruce.landsberg@apoa.org
PROGRAM POINT OF CONTACT: same as above

SERVICE AREA(S)/INITIATIVE(S)

National Aviation Weather Initiatives:
1: 4 **5:** 5 **7:** 11

FUNDING

- ***Programmed/Planned ($'s/FY):*** /FY03 /FY04

TYPE OF PROGRAM/APPLICATION

General Aviation Pilot Training

SCOPE OF PROGRAM/PROJECT

- ***What's being developed, procured, etc.*:** *a series of training videos for general aviation pilots.*
- ***How operations will be changed/improved*:** *these videos are part of an ASF developed outreach program. The objective is to reach new private and instrument rated pilots who are unable to come to safety seminars.*

PROGRAM/PROJECT MANAGEMENT

- ***Basic guidance document for this program:*** The Air Safety Foundation mission statement.
- ***Program/Project verification process:*** Internal ASF procedures.
- ***Method used for end product validation:*** User feedback and critiques.
- ***Operational training for the user:*** N/A

SCHEDULE/IMPLEMENTATION

- ***Next major program milestone:*** N/A
- ***When program will become operational:*** APWE is an operational outreach activity.
- ***Plans for further improvements:*** N/A

Aviation Weather Hazard Characterization System (AWHCS)

PROGRAM/PROJECT:
LEAD AGENCY: Oklahoma University Center for Analysis and Prediction of Storms (CAPS)
LEAD AGENCY POINT OF CONTACT: Dr. Kelvin Droegemeier, Director, Center for Analysis and Prediction of storms, 405-325-0453, kkd@ou.edu
PROGRAM POINT OF CONTACT: Dr. Kelvin Droegemeier, Director, Center for Analysis and Prediction of storms, 405-325-0453, kkd@ou.edu

SERVICE AREA(S)/INITIATIVE(S)

- ***National Aviation Weather Initiative:***
  N/A

FUNDING

- ***Programmed/Planned ($'s/FY):*** /FY03 /FY04

TYPE OF PROGRAM/APPLICATION

Product Development

SCOPE OF PROGRAM/PROJECT

- ***What's being developed, procured, etc.:*** *a capability of assimilating observations from contiguous NEXRAD radars, along with data from other remote sensing platforms, to create a three-dimensional, gridded database of atmospheric variables to generate an analysis of aviation weather impact variables including icing, turbulence, and convection.*
- ***How operations will be changed/improved:*** *provides a very detailed depiction of weather parameters over a selected region and can be implemented nationally. Data and products could be unlinked for use by pilots.*

PROGRAM/PROJECT MANAGEMENT

- ***Basic guidance document for this program:*** Program plan developed by the Center for Analysis and Prediction of Storms with collaborators at the National Center for Atmospheric Research, MIT/Lincoln Laboratory, and the NOAA Forecast Systems Laboratory.
- ***Program/Project verification process:*** N/A
- ***Method used for end product validation:*** N/A
- ***Operational training for the user:*** Hands-on instruction with tutorials.

SCHEDULE/IMPLEMENTATION

- ***Next major program milestone:*** N/A
- ***When program will become operational:*** Complete
- ***Plans for further improvements:*** N/A

Aerospace Short Courses (ASC)

PROGRAM/PROJECT: Continuing Education [www.kuce.org/aero]
LEAD AGENCY: University of Kansas
LEAD AGENCY POINT OF CONTACT:
PROGRAM POINT OF CONTACT: Jean Rosenthal, 785-864-4758, jrosnthl@ku.edu

SERVICE AREA(S)/INITIATIVE(S)

- ***National Aviation Weather Initiative:***
  5: 5

FUNDING

- ***Programmed/Planned ($'s/FY):*** /FY03 /FY04

TYPE OF PROGRAM/APPLICATION

Training

SCOPE OF PROGRAM/PROJECT

- ***What's being developed, procured, etc.:*** *courses on aircraft icing and aviation weather hazards that provides an understanding of the primary weather hazards faced by all aspects of aviation.*
- ***How operations will be changed/improved:*** *enable pilots to make preflight and in-flight weather-related decisions intelligently.*

PROGRAM/PROJECT MANAGEMENT

- ***Basic guidance document for this program:*** The annual University of Kansas Aerospace Short Course schedule.
- ***Program/Project verification process:*** N/A
- ***Method used for end product validation:*** N/A
- ***Operational training for the user:*** Class room training.

SCHEDULE/IMPLEMENTATION

- ***Next major program milestone:*** N/A
- ***When program will become operational:*** This is an operational program.
- ***Plans for further improvements:*** N/A

Cooperative Program for Operational Meteorology, Education, and Training (COMET)

PROGRAM/PROJECT: [http://www.comet.ucar.edu/]
LEAD AGENCY: National Center for Atmospheric Research (NCAR)
LEAD AGENCY POINT OF CONTACT:
PROGRAM POINT OF CONTACT: Dr. Joseph Lamos, (303) 497-8465, lamos@comet.ucar.edu

SERVICE AREA(S)/INITIATIVE(S)

- ***National Aviation Weather Initiative:***
  N/A

FUNDING

- ***Programmed/Planned ($'s/FY):*** /FY03 /FY04

TYPE OF PROGRAM/APPLICATION

Training

SCOPE OF PROGRAM/PROJECT

- ***What's being developed, procured, etc.:*** *training modules for providers of aviation weather information.*
- ***How operations will be changed/improved:*** *trained forecasters will make better forecasts resulting in safer and more efficient aviation operations.*

PROGRAM/PROJECT MANAGEMENT

- ***Basic guidance document for this program:*** N/A
- ***Program/Project verification process:*** N/A
- ***Method used for end product validation:*** N/A
- ***Operational training for the user:*** N/A

SCHEDULE/IMPLEMENTATION

- ***Next major program milestone:*** N/A
- ***Program becomes operational:*** This is an operational program.
- ***Plans for further improvements:*** N/A

National Weather Association (NWA)

PROGRAM/PROJECT: [http://www.nwas.org/committees/avn-wea.html]
LEAD AGENCY: National Weather Association (NWA) Aviation Weather Committee
LEAD AGENCY POINT OF CONTACT:
PROGRAM POINT OF CONTACT: Larry Burch, (801) 320-2569, larry.burch@noaa.gov

SERVICE AREA(S)/INITIATIVE(S)

- ***National Aviation Weather Initiative:***
  1: 4 **4:** 3 **5:** 5

FUNDING

- ***Programmed/Planned ($'s/FY):*** /FY03 /FY04

TYPE OF PROGRAM/APPLICATION

Training

SCOPE OF PROGRAM/PROJECT

- ***What's being developed, procured, etc.:*** *on-line training for pilots dealing with thunderstorms and winter weather flying.*
- ***How operations will be changed/improved:*** *better decision making by pilots resulting in safer and more efficient aviation operations.*

PROGRAM/PROJECT MANAGEMENT

- ***Basic guidance document for this program:*** N/A
- ***Program/Project verification process:*** N/A
- ***Method used for end product validation:*** N/A
- ***Operational training for the user:*** N/A

SCHEDULE/IMPLEMENTATION

- ***Next major program milestone:*** N/A
- ***Program becomes operational:*** Formal courses have been completed. Links are still available to take the courses informally on line.
- ***Plans for further improvements:*** N/A